Titel des Beitrags: Depth Perception of Augmented Reality Information in an Automotive Contact Analog Head-Up Display

Abstract: In an automotive contact analog head-up display (cHUD), virtual information can be presented in augmented reality manner in the driver's primary field of view, minimizing mental transformation effort for the driver. Whether virtual information in the cHUD is really perceived at the correct location in the environment depends on several factors such as the technological specifications of the cHUD, the design of the virtual information or environmental conditions. One possibility to realize a cHUD is to implement an upright virtual image in a distance at which human depth perception is supposed to rely on monocular depth cues only (textgreater 6m). So far it has not been investigated whether this technology succeeds at conveying the correct spatial impression of the virtual information to the driver. In the current study, we investigated whether depth perception of lying navigation arrows in a cHUD with a fixed virtual image distance of 10m was influenced by (a) whether the arrow was overlaid on the road surface or superimposed on a leading vehicle and by (b) whether it was
shaded/ desaturated with increasing distance or not. Arrows were randomly presented for 1sec at suggested distances of 20, 25, 30, 35, and 40m. Participants had to match the virtual arrows in the cHUD to distance markers in front of the car. Superimposition led to a significant increase in errors compared to the projection onto the street surface but did not affect reaction times. Increasing distance led to significantly increased reaction times but fewer errors (speed-accuracy tradeoff). The impact of superimposition on error rates was significantly more pronounced in nearer distances. Shading did not have an effect on error rates or reaction times. The results have important implications for the further development of automotive cHUD technology and related design concepts.

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